optimal. Again, equation (133) is a square function of the coefficient vector c[m] with one single minimum with respect to c[m]. The minimum is achieved by setting the derivation of equation (133) zero, and by resolving for c[m]. As a result thereof, the compensation vector c[m] can be denoted by

$$c[m] = \sum_{l=m-R+1}^{m} \left(F[m-l]A[l] + G[m-l]A^*[l] \right) + \sum_{l=m-R+1}^{m-1} \left(Q[m-l]c[l] + R[m-l]c^*[l] \right) . \qquad (134)$$

The matrices F(1), G(1), Q(1), R(1), A(1), B(1), C(1), D(1), , 1 = 0, 1, ..., R-1 are defined as

(135)

$$F[l] = \left(B^{-1}[0]D[0] - D^{*^{-1}}[0]B^*[0]\right)^{-1}\left(-B^{-1}[0]C[l] + D^{*^{-1}}[0]A^*[l]\right)$$
$$G[l] = \left(B^{-1}[0]D[0] - D^{*^{-1}}[0]B^*[0]\right)^{-1}\left(-B^{-1}[0]A[l] + D^{*^{-1}}[0]C^*[l]\right) ,$$

(136)

(137)

$$Q[l] = \left(B^{-1}[0]D[0] - D^{*^{-1}}[0]B^*[0]\right)^{-1}\left(-B^{-1}[0]D[l] + D^{*^{-1}}[0]B^*[l]\right)$$
$$R[l] = \left(B^{-1}[0]D[0] - D^{*^{-1}}[0]B^*[0]\right)^{-1}\left(-B^{-1}[0]B[l] + D^{*^{-1}}[0]D^*[l]\right) .$$

(138)

(139)

$$A[l] = \int_0^{2\pi} W(e^{j\theta}) H_{\mathcal{I}}^{*}(e^{-j\theta}) H_{\mathcal{U}}^{l}(e^{j\theta}) e^{-j\theta l N} \, d\theta$$

$$B[l] = \int_0^{2\pi} W(e^{j\theta}) H_{\mathcal{I}}^{*}(e^{-j\theta}) H_{\mathcal{I}}^{l}(e^{j\theta}) e^{-j\theta l N} \, d\theta$$

(140)

(141)

$$C[l] = \int_0^{2\pi} W(e^{j\theta}) H_{\mathcal{I}}^{*}(e^{-j\theta}) H_{\mathcal{U}}^{T}(e^{-j\theta}) e^{-j\theta l N} \, d\theta$$

$$D[l] = \int_0^{2\pi} W(e^{j\theta}) H_{\mathcal{I}}^{*}(e^{-j\theta}) H_{\mathcal{I}}^{T}(e^{-j\theta}) e^{-j\theta l N} \, d\theta \, .$$

(142)

The matrices F(1), G(1), Q(1), R(1), , 1 = 0, 1, ..., R-1 do not alter with time. They can be calculated once and then memorized. The only calculations that need to be carried out for each time stage is the evaluation of equation (134). As compared to the statistical calculation, the deterministic calculation requires more calculation because the matrix multiplications 2R(I x U) and 2R - 2 (IxI) have to be carried out as compared to the matrix multiplications R (I x U) in the statistical calculation. The additional complexity is due to the fact that cm also depends on the complex conjugate values of the data.

As will be still explained herein after, the statistical and the deterministic calculation almost yield the same results so that the statistical calculation is preferable on account of the fact that less

calculation is required.

If the data blocks are transmitted with a cyclical prefix, the last P values of each time domain block are set in front of said block. The cyclical prefix may be described by using slightly modified base functions for the information transmitting sounds and for the compensation sounds.

$$h_u[n] = e \begin{cases} j\frac{2\pi}{M}u(n-P) & u \in \mathcal{K}_U, \text{ n=0,1, \ldots ,N+P} \\ 0 & \end{cases} \qquad (143)$$

$$h_i[n] = \begin{cases} e^{j\frac{2\pi}{M}i(n-P)} & i \in \mathcal{K}_I, \text{ n=0,1, \ldots ,N+P} \\ 0 & \end{cases} \qquad (144)$$

The vectors $\mathbf{h}_u[n]$ and $\mathbf{h}_i[n]$ are still composed in the same way as in equation (110) and (107) but with the new prefixed values of $h_u[n]$ and $h_i[n]$.

In the complete derivations of the statistical and the deterministic methods of calculation, the particular form of the base functions (110) and (107) are not taken into consideration in the calculations. When the base functions are replaced by equation (144) and (143), the other equations still remain valid.

In conclusion, a simulation of the statistical method is now indicated when said method is applied to a system with a cyclical prefix.